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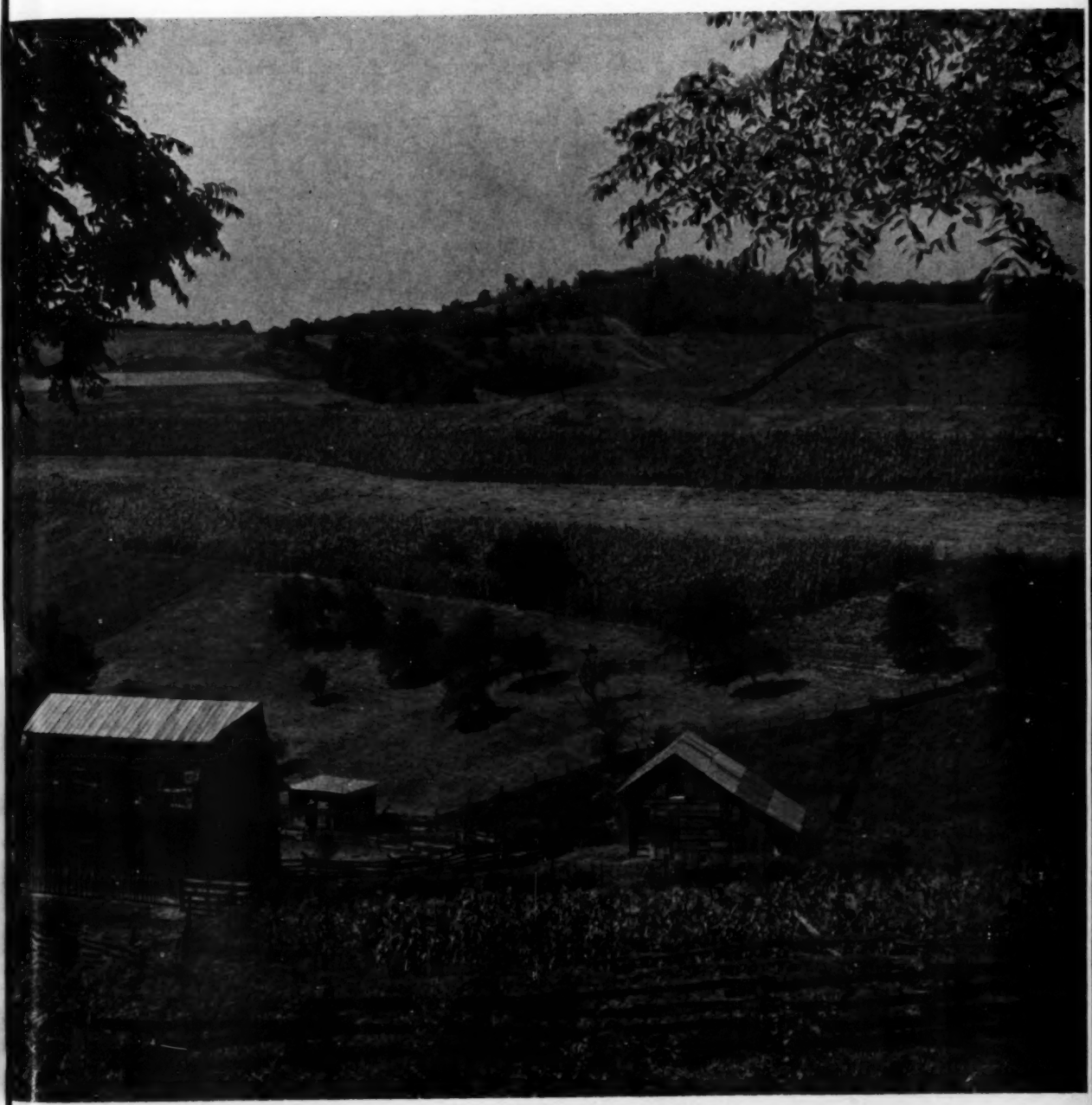
JUNE 1962

Soil Conservation



SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

VOL. XXVII, NO. 11 JUNE 1962

Growth Through Agricultural Progress

Soil Conservation 25 Years Ago

"A little more than 20 years ago there were some fine stands of bunch-grass on the Colville Indian Reservation in Washington. Indian grazing in those areas had not been severe, so that the grass remained almost in its virgin state, while outside the reservation it already had been grazed down to the roots. . . .

"The Hayden surveying expedition of 1870 found this same rich stand of grass in Utah and Wyoming, a vivid contrast to present conditions in areas where weeds, annual grasses, and other growths of less forage value have replaced it in some places, and sagebrush . . . has become the dominant plant in others. . . .

"The immediate heritage will be bare soil, rough land, and a mere subsistence or starvation condition unless the balance soon is restored in some measure. Restoration of this balance is the aim of the Soil Conservation Service."

CONTENTS

PAGE

243 Soil and Water Problems for Two Centuries
By Donald A. Williams

244 Conservation Farming Overcomes Southeast's Problems
By T. S. Buie

246 After a Century New Generation Takes Over
By Robert F. Tagner

248 A Half-Century of Soil Stewardship
By Gerald W. Easton

250 Farming History in Old Tile
By M. M. Weaver and Marion G. Leiby

252 Conservation Legislation Sparked by "Dust Bowl"
By Marvin Jones

254 "Village Blacksmith" Forges Conservation Links
By R. C. Barre

255 Centennial of Stripcropping
By Glenn D. Garvey

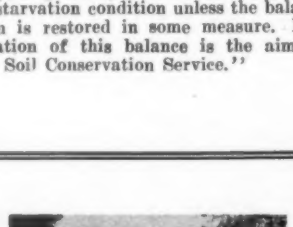
257 Soil and Water Research Spans a Century
By Carl W. Carlson

259 Grass Along the Bitterroot
By C. A. Rose

260 Conservation Helps Lick Sedimentation Bugaboo
By John N. Holeman

262 Old Farm Stays Proudly On
By David A. Bennett

263 Book Review



COVER PICTURE—The old and the new! Old rail fences and outbuilding on the Lyda E. Martin farm in Harrison County, W. Va., harmonize with the contour stripcropping and tree and wildlife plantings included in the complete soil conservation system.

Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

SOIL CONSERVATION is the official organ of the Soil Conservation Service, published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication was approved by the Bureau of the Budget, June 26, 1958.

FRANK B. HARPER, Editor

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Soil and Water Problems Concern for Two Centuries

By Donald A. Williams

THE face of the land has changed greatly all across the United States in the last hundred years. Changes wrought by man's axes, plows, and herds had their beginnings much earlier in the eastern and southern Colonial regions; and men like George Washington and Thomas Jefferson sought, with little success, to encourage cropping and tillage practices that would protect the land from erosion.

It took a hundred years or more for us to heed, through any general concerted action, the warnings of those Colonial statesmen and agriculturalists. Men still living, or their fathers, had a hand in the clearing and plowing and grazing that so often upset Nature's land and water balance, from mountain slope to flood plain. Theodore Roosevelt, Gifford Pinchot, and Hugh Bennett were the leaders in a 20th Century renaissance of forest, soil, water, and other resource conservation.

It was just 100 years ago, May 15, 1862, that President Abraham Lincoln signed an act creating the U.S. Department of Agriculture, which is celebrating its centennial throughout the rest of 1962. That marked the start of a continuing national effort for improvement and fuller use of our productive agricultural resources.

It has been followed during the 10 succeeding decades by many other Congressional and administrative authorizations that have helped to bring the United States' agricultural plant to the highest state of efficiency of any in the world. Important among them have been those authorizations and directives that have led to steadily increasing conservation of our soil, water, and related resources.

In the same year 1862, President Lincoln signed the homestead and Land-Grant College acts. Agricultural agencies and programs established since have covered the widest range of interest to farmers and ranchers, and to the public generally, in connection with crops and livestock, agricultural water development and management, forests and woodlands, and wildlife. They have included the 1887 Hatch act establishing the system of State agricultural experiment stations, and creation of the Agricultural Extension Service in 1914. They included the development of modern programs in the 1930's, ranging from those for technical help in soil and water conservation and agricultural conservation cost-sharing, to expanded farm credit. economic and marketing facilities, and rural electrification.

Most significant from the conservation standpoint has been the Department's more recently authorized cooperation with and providing of technical help, through the Soil Conservation Service, to farmers' and ranchers' soil conservation districts established under State laws; its technical and cost-sharing participation in small-watershed projects, through the Watershed Protection and Flood Prevention Act; and its cost-sharing assistance through the Great Plains Conservation Program. Today's accomplishments through these programs are a far cry from the soil erosion research and limited demonstration project activities begun at the turn of the thirties.

Somewhat as a 100-year-old couple may look back with fondness and pride on their children and grandchildren, so does the Department of Agriculture have reason to take satisfaction in what its "offspring" have done to improve the lot all Americans—on the land and off—since Abe Lincoln solemnized the marriage of Federal research, educational, technical, and other efforts and facilities with land users' own needs and efforts, with the State agricultural experiment station and college as life-long "best man."

Today, for example, the conservation and economical use and management of our soil, water, plant, and wildlife resources is established public policy. Translation of this policy into action on the Nation's agricultural and public lands has moved ahead with ever-increasing speed.

Approximately 92 percent of all the land in farms and 96 percent of the farms and ranches in the continental United States are now in soil conservation districts. Federal planning or operations have been authorized for hundreds of local small-watershed projects. Operators of millions of acres in the 10 Great Plains States are applying conservation measures specially tailored for that region through the Great Plains Conservation Program.

Thus it is that we move into the Department of Agriculture's second century with entirely different attitudes, knowledge, and facilities than our 19th Century forefathers had at their command. Truly, as it has been said, "The shape of the future is on the land."

Conservation Farming Overcomes Southeast's Centuries-Old Problems

By T. S. Buie

THE water which falls on the Southeast today carries less soil to the sea than at any time since the early settlers cleared the land to grow clean cultivated crops like cotton and tobacco and land exploitation began.

Early settlers in the Southeast judged whether land was fertile by the height of cane growing near streams. Where the cane grew "higher than a man's head," there they built their cabins. Two centuries later, much of the Southeast consisted of areas of ruined or depleted land, deep-washed gullies, and wornout and abandoned farms.

From Colonial times there were those in each generation who spoke out against misuse of the land, but the period of exploitation ended only with the beginning of the current conservation movement in the 1930's.

Although various farmer groups and agricultural societies active in the mid-eighteenth century made great contributions to the ideas which were later to find expression in the U.S. Department of Agriculture, it was only after little new land was left to clear that Southeastern farmers generally had showed an interest in soil saving.

Hillside ditches represented their first effort at erosion control. The object was to intercept water flowing across slopes and carry it off to the sides of the field; but, because of faulty design, they often broke, concentrating the water and causing gullying. As a result, the hillside ditches were gradually replaced by bench terraces, remnants of which still can be found in many sections of the Southeast.

Unfortunately, the design of the bench terraces was little better than that of the hillside ditches, and their shortcomings likewise resulted in gullying and other damage to the land; and the Mangum and other types were devised, including the Nichols broad-base terrace developed in 1924. For years, county agents throughout the Southeast labored long and hard to help farmers build terraces on sloping fields; but, because of inadequate instruments and equipment, many of these terraces also were ineffective.

During these years, as attention began to be given by State and Federal experiment stations to the importance of proper use and care of the soil, emphasis was usually placed on how to get the most out of the land, with little attention given to protecting and preserving the soil itself.

The installation of adequate water control and soil conservation measures on sloping land frequently require the movement of earth. Until comparatively recent years, the only power available on farms was that provided by human and animal muscle, making such earthmoving costly and burdensome, and handicapping efforts to introduce soil conservation practices on a wide scale.

Another hindrance was the absence of adequate social "tools" for the individual farmer, the scientist, and the technician to use in the solution of conservation problems.

Beginning in the 1920's and early 30's, there was a decided upsurge in public appropriations for agricultural research. One of 10

1880 picture of settler clearing land.

Note:—The author is State conservationist, soil Conservation Service, Columbia, S. C.

erosion control experiment stations, for which the first appropriation was made by Congress in 1929, was located at Statesville, N.C. Results obtained there and elsewhere were basic in the establishment of the current soil and water conservation program throughout the Southeast.

During the mid-1930's, various Federal and State agencies, like the Soil Conservation Service, were either established or expanded to provide more soil and water conservation assistance. The most notable development of this period, however, was the start of farmers' own soil conservation districts, first of which, the Brown Creek, was established in North Carolina. They provided the mechanism to enable farmers to organize for the purpose of saving their soil and to insure a more permanent agriculture for the community, and a fair standard of living for themselves and succeeding generations.

This challenge was quickly accepted by the landowners, and the creation of districts mushroomed in the Southeast, where today all of the States are entirely within districts except for one county in Virginia and a small tip of Florida. Public expenditures—for technical help, ACP cost-sharing, and other assistance—represent only a small part of the the total spent for the promotion of soil and water conservation practices. It is safe to say that during the past 25 years farmers in the Southeast have spent several billion dollars for conservation of their land and water resources.

The shifts in land use that had taken place between 1930 and 1959 in the 7 States of Alabama, Georgia, Mississippi, North and South Carolina, Tennessee, and Virginia, are significant. (Florida is omitted because of dissimilar census data.) Harvested cropland, for example, dropped from some 40⅝ million acres to only 27 million acres; while pasture increased from about 20⅛ million acres to 23¾ million acres, and woodland acreage from approximately 44 million to nearly 45½ million acres. Total farm acreage, meanwhile, declined from 122¾ million acres to about 107½ million acres.

To June 30, 1961, the SCS had helped 1,887,000 soil conservation district farmers over the country develop soil and water conservation plans. What districts have accomplished in changing the face of the Southeast is shown in the record of conservation measures they had put on the land. Representative are the more than ⅓ million miles of terraces, considerably more than a quarter of a million farm ponds, between 13½ and 13¾ million acres of pasture planted, contour striperopping approaching half a million acres, 4½ million acres of trees planted, and more than half a million acres of wildlife areas developed.

Now, as one travels through the Southeast, he accordingly sees on every hand this physical evidence of what has taken place. What this has meant in the lives of the people was summarized by one farmer in these words: "Since I have been farming the conservation way, I have made a good living, educated my children, and gained the respect of my neighbors."

The lands of the Southeast have staged a comeback.

Terraces commonly were built with mules and fresno in early conservation days.

Tractor and scraper are among machines used for terracing jobs today.

W. D. "Pinky Bill" Mathews, Jr., and "Pop."

After a Century

New Generation Takes Over

By Robert F. Tegner

IN Scott Valley's picturesque farming area tucked away in the mountains of northern California are a father and son who are living links in a cattle business that started more than a century ago—in 1852. That was 10 years before Congress and Abraham Lincoln created the Department of Agriculture.

You get a feeling when you cross the mountains from Yreka into Scott Valley—about 20 miles or so—that something out of the West's rich past, its history of ranching and mining, still lives on here.

And so it does—in the fascinating old farmhouses; the main streets of Fort Jones, Etna, and Callahans, that look like scenery from a Hollywood western; the old isolated cabins in the gullies and on the hills; the remnants of mining that started more than a century ago when '49er fever fired men's imaginations. It lives on in names that are legend and have fascinating stories by the score associated with them.

This story is about just one of those names and the two men who share both the name and the tradition begun by the first Mathews to set foot in the valley. It is a story about how the valley changed down through the years of land clearing and plowing, and how conservation treatment today is restoring and protecting its soil and water resources.

In a modest little home on Fort Jones' main thoroughfare live W. D. Mathews, Sr.—"Pop," everybody calls him—and his wife, Gertrude. "Pop" is 88 years old. He was born January 4, 1874, the fifth of seven sons of I. S. "Matt" Mathews. He has lived in the valley all his life and is the last remaining offspring.

Elsewhere in the narrow, 35-mile-long valley—over in the southern reaches near Etna—lives his son, W. D. Mathews, Jr.—"Pinky Bill." Another son, Ed Mathews, manages the Siskiyou County Fair; and a daughter, Jewel, is the wife of a Scott Valley banker, Ernest Smith.

It was in 1851 when Pop's father, Matt Mathews, an erstwhile New York tailor's cutter turned packer, rode a saddle mule from Sawyer's Bar on the North Fork of the Salmon River across the mountains into Scott Valley. The valley, the river that meanders through it, and the bar near where it empties into the Klamath are named for John W. Scott, credited with discovering of gold there in 1850.

Listen as Pop tells the story:

"It was late summer of 1851, near as I can recall Dad telling it, that he came in with this bunch of fellers looking for the lost Cabin Mine. Some miner had come into Sawyer's Bar where Dad was headquartered, telling about this strike he had made. And he had gold, too, to prove it."

History does not indicate whether the Lost Cabin was found; but gold was, and the place soon swarmed with gold-seekers.

Matt saw something else and liked what he saw—tall, lush grass and thick brush abounding in game—a lazy, clear-running river that teemed with salmon, steelhead, and smaller trout.

Matt returned the next year and entered the cattle business, supplying meat to the miners. He set up butcher shops in the mining camps, and he went into partnership with others, including his former partner in pack-train operations on the other side of the mountains, John Fairchilds.

"As near as I can place it, Dad came to Scott Valley to stay permanently in about 1864," Pop recalls. "He bought up the first patented land in the valley from a man named Julian, who had settled on it in 1852."

That land became part of the 1,200-acre Star Ranch which Matt farmed until he turned it over to his sons—"The Mathews Brothers."

More farmers settled in Scott Valley. They cleared the land and raised cattle, hogs, sheep, and horses, which they put out on native pasture. They put in crops like wheat, oats, and hay.

"Why, I can remember as a boy," Pop said of later years, "looking out across a field of timothy so high I couldn't see my Dad aworkin' in it."

"Pinky Bill" tells a story Pop forgot—how Matt dreamed up the idea of building a plow in a blacksmith shop to turn the sod in the soggy bottom lands. Pop, "a pretty good blacksmith," did the

Note:—The author is field information specialist, Soil Conservation Service, Berkeley, Calif.

job.

In its native state, the Scott River was flanked by cottonwood and willow. Much of the valley floor was covered with wild plum, oak, pine, fir, and cedar. The river overran its banks consistently each winter, and periodically there were real floods. But the brush, trees, and grass held the soil.

After the settlers logged the watersheds and the farmers cleared the land as close to the river as they could get, the situation changed. Now the high water, unimpeded by natural vegetation, rushed down the valley, tearing out the soil and leaving debris on the croplands and mud in the farm buildings. Big floods occurred periodically from 1861 to 1941. After every flood, men and teams hauled away the trees, roots, and other debris left on the land.

Men tried to change the river. They straightened it but it only ran faster and caused more damage. They piled trees by the hundreds along areas hit worst by the rampaging river. With no modern equipment, they drove piling by hand. They even handloaded rock and hauled it with team and wagon to the river, dumping it along the ravaged banks—but to no avail. The piling rotted and tore away, the trees floated out of place, and the rock—too light for the job—rolled into the river and sank to the muddy bottom.

After a flood in 1948-49, some farmers decided it was time for new, scientifically planned action. One of them was Bill Mathews, who helped form and became a director of the board of supervisors of the Siskiyou Soil Conservation District, and is a member of the California State Soil Conservation Commission.

The Soil Conservation Service provided technicians to work with the district. They found, for one thing, that there was not enough vegetation to hold the streambanks. They decided it would be best to keep the river flowing in gentle curves to slow down its flow; and, after trying several measures, they concluded the only way to hold the banks was with heavy rock. This rock work has held, and a number of farmers are using it. The SCS also brought in new ideas on land leveling, irrigation, drainage and crop rotation systems.

Meanwhile, Bill Mathews sold the old Star Ranch and bought acreage which he figured would be more suitable for irrigation. He is experimenting with new grasses, which enable him to run 2½ head of cattle where only one animal was supported before, or about 250 head all together.

Although tradition gives way slowly, the conservation movement is gaining ground, and a new generation with new conservation technology is taking over in Scott Valley.

Conservation-managed Scott Valley more than a century after it was opened to settlement.

A Half-Century of Soil Stewardship By This Wisconsin Family

By Gerald W. Easton

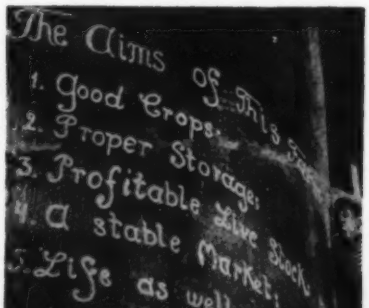
IT was 55 years ago that the Rev. W. J. Dougan gave up his ministry in Poynette and settled his family on a 115-acre farm just east of Beloit in Wisconsin's Rolling Rock County.

The 73-mile trip was a long one in 1907. They traveled in an old farm wagon that carried all their meager belongings. Trailing along behind was the family cow. Reverend Dougan and his family started farming with little more than a hoe and a plow, a horse, a crate of chickens, the cow, a mortgage, and a prayer.

But Reverend Dougan had something far more important to successful farm life. He had an ingrained love for the land, and definite goals for its use. And he was willing to work for the kind of family living that puts moral values above wealth.

The aims of the family inscribed on the silo by the elder Dougan still can be read: They are: "Good crops; proper storage; profitable livestock; a stable market; and life as well as a living." How to attain these aims was a question that often taxed the ingenuity of Reverend and Mrs. Dougan. Ronald Dougan, the elder son, who today owns and operates the farm, recalls that his parents worked methodically, never wavering in their approach to a full life.

Good crops were sought by trial and error. One of those tried was alfalfa, a much publicized crop not yet in common use in those days. The inoculation problem was handled by hauling soil from fields where legumes already had been grown to new areas. Lime and fertilizer were applied to relatively new soils, with outstanding success.



Rev. W. J. Dougan proclaimed his belief in soil stewardship by printing his aims on the silo years ago.

Proper storage, to retain the feed value of hay and grain for livestock, was almost as difficult to master as raising good crops. The Dougans' first storage space was a round barn. Its roundness added to its convenience and the efficiency of its use. Other storage buildings followed, each planned for maximum efficiency.

Ronald remembers when his father, although in debt, set about to improve his livestock. He hesitantly approached local bank officials for further financing. His reputation for honesty, hard work, and his firm determination to make good on his goals stood him in good stead. The bank did not hesitate; and, with a sizable loan, he was able to buy a foundation herd of 20 Guernseys.

When the Dougans began their dairying operations, they found the market anything but stable. But, by establishing a bottle milk business in Beloit and starting a small delivery route, they were able to make a go of it. The Dougans' milk wagon soon came to be a familiar sight, and the farmer-minister became known as "Daddy Dougan" to all the youngsters on his route.

Family, church, and community affairs took a regular place in the Dougans' lives. The 4-H program was important to the two boys, and Mom and Dad had time to give an "assist" whenever it was needed.

Today, the resources and operations of this Rock County farm have multiplied several times over from those of half a century ago. Instead of its 115 acres, 20 cows, a small milk room, and a modest milk route, the farm now totals 550 soil and water conservation treated and managed acres, 120 milk cows and a total herd of 230 animals, and 11 big milk routes with 30 employees to take care of the farm's operations. It also is one of the leading southern Wisconsin seed corn producing and processing farms.

Like his father, Ronald works toward the aims inscribed on the silo long years ago. But, unlike his father, he doesn't have to depend upon chance to achieve his goals. Scientific farming developments play a big part in his "life as well as living." So do modern conservation-farming methods, un-

Note:—The author is work unit conservationist, Soil Conservation Service, Lancaster, Wis.

known to the elder Dougans.

When Rock County farmers organized their soil conservation district in 1949, Ronald Dougan was one of the first to adopt newly advocated erosion-control measures. Like his father, he feels the soil is "alive."

"I have been placed in charge of the soil, not as an owner, but as a steward," Ronald says. "I want to pass this gift of God on to future generations in as good or better shape than it was when I received it."

The son's actions show his feeling toward soil conservation—his awareness of his own everyday conservation needs, and his purpose of doing something about them. This past year, for example, he added 60 acres to his farm—a rundown tract regarded by his neighbors as almost having reached the point of no return. His first move was to ask the soil conservation district for technical help from the Soil Conservation Service. As a result, he already has built 3 miles of terraces and 1½ miles of grassed waterways, to make the water "walk down the hill," as he expresses it, and to make more of it available for crop production.

In the restless, searching spirit of his father, Ronald Dougan still is trying new varieties of crops and crossbreeding cattle for more efficient production. A true conservationist and nature lover, he rarely leaves his house without his field glasses. To increase wildlife on his farm, he has built a farm pond and planted pine trees and wild shrubs around it. Other conservation projects are in the making, with the end "not in sight," Douyan says.

The efforts of the late elder Dougans are not forgotten. You will find their names inscribed as "Master Farmers" for outstanding achievement and on the farm honor roll at the Wisconsin College of Agriculture—fitting tribute to a courageous couple. In their love of God and His precious gift to man of soil and its rewarding resources, the religiously rooted Dougan family has molded a pattern for generations ahead to follow.

Dougan's round barn is the hub of his operations. (Milk bottling plant partly hidden by trees.)

The Dougan farm, showing terraces, erosion-control structure, and wildlife area development around pond.

■

"In observing these events," Secretary of Agriculture Orville L. Freeman said of Rural Life Sunday, May 21, and Soil Stewardship Week running through June 3, "all of us should reflect upon the blessings that have come from the richness of our land and the skill of our people.

"We should express special thanks for our great human and natural resources, be appreciative for our vast agricultural abundance, and seek ways of working together to improve and conserve these precious gifts of the Creator."

Many church and agricultural groups traditionally observe Rural Life Sunday and Soil Stewardship week, with special sermons, programs, and other activities.

Farming History

IN OLD TILE

By M. M. Weaver and Marion G. Leiby

TILE drainage has kept pace with the rest of agriculture during the last century. Today it is an important means of bringing about efficient conservation land use on fields brought into cultivation through the years since the country's earliest settlement.

Tile has been used since 1835, when John Johnston, "Father of Tile Drainage," first tiled his farm at Geneva, N. Y. Because of the results he obtained, the practice spread rapidly. From New York to Maryland and elsewhere in the humid areas of the country a history of farming can be written from their tile. The evolution in the kind of tile has marked the evolution in farming itself.

A rather simple tile manufacturing machine from England was delivered at Geneva in 1848 at a cost of 47 pounds and 1 shilling, and was placed with B. F. Whartenby of Waterloo, N. Y. It was capable of making from 4,000 to 6,000 tile a day. They sold for less than a cent apiece. This machine was operated by 2 boys and 2 men.

Harvey Jackson, still farming at 85, with old tile replaced by modern tile.

A modern tile factory can now turn out 100,000 tile a day. We had reached an estimated 300 million feet of tile production in 1959.

A hundred years ago, tile as small as ¾ inch diameter was used. The usual size for laterals was 2 inches. Today, we commonly use 4- to 8-inch tile.

From 1850 to 1859 there were 66 tile factories established in the United States; from 1860 to 1869, 234; and from 1870 to 1879, 840. By 1880, there were 1,140 factories in operation in 8 States in which they were recorded—Indiana, Illinois, Ohio, Michigan, Iowa, Wisconsin, New York, and Pennsylvania.

Prior to 1859, Pratt and Bro. of Canadaigua, N. Y., patented a horse-powered wheel-type tile trencher. Other early trenching machines included the Blickenderfer, Hickok, Rennie Elevator Ditcher (patented in 1869), and Johnson. The first steam operated machine, the Plumb, was used successfully in 1883.

Before 1862, almost all tile trench was dug by hand. Improvements in handtools before 1880 increased the ease of digging. In 1885, 50 years after Johnston laid his first tile, the dipper dredge was invented, making possible the digging of large ditches, into which the tile drained, at a low cost.

Queen Anne's County, Md., provides a good example of the early-day tile drainage and present-day tiling in conservation farming. Some oldtimers believe tiling in the county dates back to the Civil War or before. If early farmers

John Johnston—"Father of Tile Drainage."

in this county followed conventional practices of their day, hollow logs and rock drains were forerunners of tile.

Harvey A. Jackson, still farming at 85, has tile which was laid about 10 years before World War I. Some of his old tile still work.

Jackson watched the Queen Anne's Soil Conservation District's tile-trenching machine with interest as it opened a trench 20 inches wide and 4½ feet deep when he had to replace some 4-inch horseshoe tile with 6-inch clay tile.

"The last time I dug that tile up," he said, "it took me nearly a week with three men, and here this machine has done the job in 3 hours. I'd say times have changed."

This trench cost 15 cents a foot with the trencher, compared to 50 cents a foot it would have cost by hand. The saving about covered the cost of the new tile.

Jackson's tile drains a wet area too large to farm around, yet too close to the farm buildings for wetland wildlife development, consistently taken into consideration in conservation farm planning.

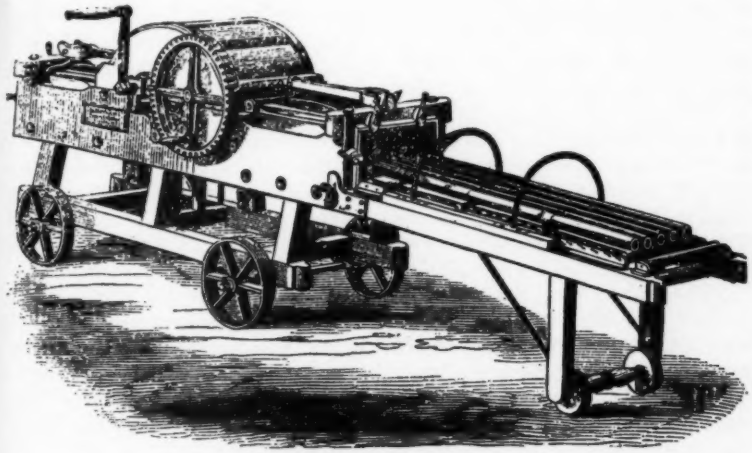
There were wet areas on several farms in the county last year alone,

Note:—The authors are engineering specialist, Waterloo, N. Y., and conservation aid, Centreville, Md., both of the Soil Conservation Service.

for example, that the Soil Conservation Service technicians recommended be retained for wetland development.

The oldest tile specimens that have been found in Queen Anne's County are 2- and 4-inch horseshoe-shaped tile with flat bottoms. These early gave way to a hexagon-shaped tile with round core; and there was a short period during which locally made round concrete tile also was used. The trend locally the last 40 years has been to use round clay or shale tile.

Fifty years ago, in the days of light, horse-drawn farm equipment, tile was laid in the middle zone a few inches below plow depth. Today, it is laid near the bottom of the root zone of average farm crops. As a result, the effective zone, or "cone of drawdown," is wider, lines may be placed farther apart, and the tile is protected against crushing by today's heavier farm equipment. Greater depth also gives more effective drainage.



SCRAGG'S PATENT TILE MACHINE.
First tile-making machine imported into the United States.

Modern tile-laying machine operating on Carl Werner farm, Church Hill, Md.

100 YEARS AGO

"Whilst our national pride is gratified in comptemplating such a greatly increased production, it must occur to every reflecting mind that under our present mode of agriculture, it may be at the expense of the soil. But few greater calamities could befall a nation than the impoverishment of its lands. Virginia stands as a lesson to the other States. Her unskillful tobacco cultivation ruined the finest portions of her territory. As in Palestine and other countries of the east, now barren from the destruction of their soil by reckless cultivation, our lands once destroyed remain so, and thus the territorial limits of our States are in fact diminshed. Nations wage wars in vindication of their right to a few acres, but permit the destruction of many from want of knowledge in the farmer.

"In the absence of an account in the census returns of the acres of pasture lands, and of the ploughed acres, it is difficult to determine the extent of the deterioration of our soils by these immense annual crops. It must be great. Still we know that our agriculturists are aware of this evil, and that the use of fertilizers is rapidly increasing ....The increase of clover seeds during the last decade has been one hundred per cent, and of grass seeds one hundred and sixteen per cent. This would have added not less than twenty-six millions of acres to our pasture and meadow lands, had it not been for the greatly increased exportation of seeds. This exportation was but $13,570 in 1855, and in 1861 $1,063,141; but in 1862 it fell as low as $299,255. The increase of our improved lands from 1850 to 1860 has been about fifty millions of acres; that of clover and grass seeds should have been sufficient to have seeded that number of acres."

—From Report of the Commissioner of Agriculture for the Year 1862 to the 37th Congress.

Conservation Legislation

By Ma Jone

Marvin Jones.

THE principle that conservation of our soil and water resources is essential to the preservation of the Nation is not a new idea, but years of experimentation, demonstration, and patient work were required to gain public acceptance of that principle.

Beginning in 1903, for example, the U.S. Department of Agriculture began preliminary studies of farm terracing. Some work along this line was done through the subsequent years; but it was not until 1929 that the Congress authorized the Secretary of Agriculture to conduct soil erosion investigations, including the study of terracing and other control measures. Additional appropriations were made in succeeding years.

Before the present Soil Conservation Service was created, congressional leaders, conservationists, and many other thoughtful people became alarmed at the extensive damage that was being suffered throughout the Great Plains in the area known as the "Dust Bowl," covering parts of five Southwestern States and, to some extent, other areas of the Southwest which underwent a long period of drought beginning in the fall of 1932. Very little was known at that time, however, about the control of wind erosion. At my suggestion, H. H. Bennett, the director of the agency then known as the Soil Erosion Service, established in 1934 a demonstration project to control wind erosion on an area of approximately 50,000 acres near Dalhart, Tex.

Early in 1935, two proposed bills were sent to the Congress—one by the Department of Agriculture to the House Committee on Agriculture, and one by the Department of Interior to the Public Lands Committee. There was still disagreement between the two departments. Neither of these bills contained any provision to cover dryland erosion by wind, both being limited in large measure to soil erosion by water.

Congressman Jack Dempsey of New Mexico and I took these two bills, broadened them to cover erosion both by wind and water, and extended the proposed conservation activities in other respects. We then jointly introduced the expanded bill at the same time. The Committee on Agriculture reported it, and it was passed unanimously by the House and by the Senate, and was approved by the President on April 27, 1935.

Early in the same year, 1935, a group of county judges, commissioners, farmers, and ranchers from the Panhandle of Texas met in the County Courthouse at Dumas, during one of the worst storms in the history of the "Dust Bowl." Under the stress of necessity and the need for immediate action, they

Typical of former wind erosion scenes in Texas and other Great Plains States.

Note:—The author is Chief Judge, U.S. Court of Claims, and was Chairman of the House Committee on Agriculture from 1931 to 1941.

...on Sparked By "Dust Bowl"

By Ma... Jones

drafted a pioneer piece of legislation which was enacted by the State Legislature on May 21, 1935. The State act authorized the creation of wind erosion conservation districts.

This act gave the district officials authority to enter upon and treat neglected lands which constituted an erosion hazard. It set aside 20 percent of the State automobile registration fees, as well as a part of the State ad valorem taxes, for the purposes authorized. Wind erosion districts were promptly created in nine Texas Panhandle counties. Soon thereafter a committee from the newly formed districts came to see me. It was made up of Wilson Cowen, Noel McDade, and Mal Stewart, county judges of Dallam, Moore, and Deaf Smith counties, and J.O. Guleke and John E. Hill of Amarillo. I arranged a conference with various officials of the Department of Agriculture, including M.L. Wilson, Under Secretary of Agriculture, Dr. Bennett, chief of the newly created Soil Conservation Service, and others.

As a result of this meeting, the wind erosion districts and the Soil Conservation Service entered into a cooperative program under which the Soil Conservation Service agreed to furnish technical assistance and to loan the districts some machinery and materials for carrying out the provisions of the Texas act. Very little had been done about the control of wind erosion at the time, and the agreement between the Service and the nine Panhandle districts represented what was perhaps the first concrete effort by State and Federal agencies working in cooperation to combat the problem.

When the President's Great Plains Committee visited the Panhandle of Texas, they expressed great interest in the action which had been taken, and when their report, "The Future of the Great Plains," was published in December 1936, it had this to say regarding the program then being conducted in the Panhandle Wind Erosion Conservation Districts:

"It should be emphasized that the legislation adopted in Texas, despite the shortcomings indicated above, represents, nevertheless, the furthest advance which any State has made so far in the direction of establishing significant State programs for the control of soil erosion. The State has been a pioneer, and it need not be wondered that the initial efforts indicate room for improvement. . ."

On May 13, 1936, after the Texas program had already been put in operation, the Department of Agriculture completed its draft of a standard form of a State Soil Conservation District Law, copies of which were transmitted by President Franklin D. Roosevelt to the governors of the various States asking their aid in the passage of the standard act in their States.

Happily, all of the States wisely passed enabling legislation patterned after the standard act, under which the present 2,900 districts are operating and in the promotion of which the National Association of Soil and Water Convation Districts is being operated.

The foundation for all of these operations is found in the National Soil Conservation Act approved by the President on April 27, 1935, which authorizes the various States and the national Government to jointly attack this tremendous national problem in which every man, woman, and child in the United States is vitally interested. The first of the new districts, which are now operating so effectively, was organized in 1937. The organization spread rapidly until it covers most of the land in our country.

Millions of acres in the Plains today are protected by striperopping and other conservation measures.

Octogenarian *"Village Blacksmith"* Forges Conservation Links

By R. C. Barre

EIGHTY-six-year-old Everett Haas is conspicious in the fast-declining ranks of "village smithys" because he has turned forge and anvil to the cause of soil and water conservation.

Haas, who has worked at the blacksmith trade in Ash Ridge, Ohio, for 67 years, accepted the assignment in 1957 to build the plow, with the help of his son, Tod, for the "Cairn of Peace" dedicated at Peebles, Ohio, when the United States was host to the 5th World's Conservation Exposition and Plowing Contests. The job involved unaccustomed research for a blacksmith, of library books on plows. He happened to have a book with pictures of plows dating back to the 13th century. He also searched in junk yards for plow parts.

Haas and his son, sharpen 600 to 800 plow shares each season. Years ago, Tod said, they wouldn't have had more than 25 to 30 in a season. The senior Haas has a hand painted picture in his shop of a plow he made, and pictures of the plow being pulled by a team of oxen.

"When I started," Tod Haas recalled, "if a man raised 20-25 acres of corn he was a big operator; and now, if he doesn't have 75-100 acres, he doesn't consider himself fully employed."

"We weld the antiseep collars on the pipes for farm ponds built under the soil conservation program," Tod commented.

His son-in-law, Harold Yockey, has a bulldozer and does conservation contracting work on conservation ponds and drainage system improvement ditches, including work in the Brown County Soil and Water Conservation District, planned with Soil Conservation Service technical help.

Everett Haas in his blacksmith shop.

The Cairn of Peace.

Unveiling of a "Cairn of Peace" is one of the highlights of each World Plowing Contest. The cairn is topped with stones from each country, brought to the site by the competing plowing teams, and is topped with the "Golden Plow" —emblem of world supremacy in the act and skill of plowmanship. Flags from all competing countries are flown in an arc around the monument during the event.

The plow created by Everett and Tod Haas from a photograph of a plow made in Holland in the 17th century is a nearly exact reproduction.

When the World Plowing Organization was formed in 1953,

Note:—The author is area conservationist, Soil Conservation Service, Hillsboro, Ohio.

serious consideration was given to the exact nature of the trophy which would symbolize the basic plow. In order to show strict impartiality toward the farm machinery industry throughout the world, the 18th century Norfolk Plow—a walking plow mounted on two wheels—was chosen as the model for the golden miniature trophy for which the plowmen compete. Cairns have now been placed in Canada, the Republic of Ireland, Sweden, England, the United States, West Germany, Northern Ireland, Italy, and France. The next, in 1962, will be placed in the Netherlands on October 5.

The Norfolk plow was patterned from a light-weight plow developed by the Dutch early in the 17th century, with which 2 horses and 1 man could plow an acre in 1 day. Earlier plows were clumsy tools pulled by 10 or 12 oxen, with 2 men needed to operate them.

The inscription on the "Golden Plow" trophy reads "Pax Arva Colat," meaning "Let Peace Cultivate the Fields." The plow—the key that unlocks the fertility of the soil—remains the basic instrument of food production, but the land is the most important of man's possessions. In addition to promoting plowing skill and mechanical progress, these contests have encouraged better land use.

Centennial of Stripcropping

By Glenn D. Garvey

A century of stripcropping in Wisconsin's La Crosse County confirms the sage observation that "all our past acclaims our future."

Over the country generally, contour and wind stripcropping date back to the start of the modern national action program of soil and water conservation in the 1930's. But not so in Mormon Coulee in the hilly Coulee region of the State. When the pioneers, shortly after the Civil War, were poling their families up the Mississippi River in keel boats to land at "Prairie La Cross" and mingle with Chief Decorah's Winnebagoes, stripcropping already was "old hat" to the farmers in the Coulee outside of La Crosse.

The "new" stripcropping method of farming—new in the late 1860's that is—was and is to be found on the Herbert Kramer farm lying against a steep sidehill in Mormon Coulee. It looks nearly as good today as when farming began in this area in post-Civil War days. The soil on this farm is living proof that it is possible to keep land "new" with conservation practices. This farm is almost unique, because it is one on which conservation was used *before,* not after, the land was eroded or the soil exhausted, as so often is the situation encountered by Soil Conservation Service technicians, in soil conservation districts and out.

August Kramer—German immigrant, Midwestern pioneer, and grandfather of the present owner of this remarkable farm—had the foresight to realize that the steep sidehills of the Coulee region could not be farmed safely in the manner conventionally practiced in his newly adopted land. He was convinced that what was to become the big "Corn Belt"-type farming, with fields all opened at once, just wouldn't work. Not on land this steep.

But August Kramer figured that, by alternating cultivated crops

Narrow strips on Kramer farm show up on hillside in center.

Note:—The author is soil conservationist, Soil Conservation Service, La Crosse, Wis.

with strips of hay, the runoff water could be slowed down and given time to soak into the soil. These hay strips also would add organic matter, or "body," to the soil. This way, the soil structure would be maintained and, when plowed, would be able to withstand the beating of the rain and the pressure of the runoff water. The soils in this area are deep silts, soft and friable—the kind that melt like sugar when any great amount of water washes over them—but are good soils well worth the little trouble it takes to save them.

Kramer's first attempt at stripping didn't satisfy him. He still saw some "washing" in his fields, and figured that the rushing water got too much of a start if the strips were wide. So he narrowed them. Although most of the strips in La Crosse and the surrounding area today are 60 to 100 feet wide, the Kramer strips still average only 25 to 35 feet in width, to slow the speed of the flowing water to a point where it can soak into the deep silt soils rather than run off. The idea seemed to work, so the entire farm was laid out in narrow strips.

In the early 1900's, the need for better land use over the entire country was becoming more apparent. Farmland in Wisconsin which had been in virgin timber 40 to 50 years before was badly gullied, and sheet erosion was rapidly ruining the little remaining topsoil.

The Upper Mississippi Valley Experiment Station was established in 1931 near Grandad Bluff at La Crosse, to find answers to these and other soil and water-waste problems. It was a place where people could go and actually see the results of soil conservation research. The first director of the station went down into Mormon Coulee and studied the results of the early stripcropping there. He noted the lack of sheet erosion on the steep stripcropped fields of the Kramer and other farms, and decided to set up plots with strips of various widths, to get an actual measurement of comparative runoff and soil losses.

The plots were laid out on the Hubert Hundt farm near Coon Valley, with strip widths of 50, 100, 125, and 150 feet. They were put into a rotation of 1 year of corn and a year of grain, followed by 2 years of hay. After these plots were in operation for 12 years, the yearly soil loss on the 50-foot-wide strip was only 1.4 tons to the acre, as compared to 2.62 tons on the 100-foot strip, 3.18 tons on the 125-foot strip, and 3.25 tons on the 150-foot strip.

12-plus inches of highly erodible silt loam topsoil on 22 percent slope after nearly 100 years of stripcropping on Kramer farm.

These plots thus showed beyond question that the width of the strips had a definite effect on soil loss. This experiment also showed that the pioneers of Mormon Coulee were on the right track when they stripped their steeper sidehills, with those who stuck to the narrower strips suffering even less soil loss.

Today, after more than 90 years of being farmed, a full foot of highly erodible silt loam topsoil remains on up to 22 percent slopes on the Herbert Kramer farm—and, he says, "We don't have so much as a 'dimple' in any of our fields."

Herbert Kramer and son, Jerry, with hillside strips today.

Centennial Movie

"Our Land—Its Many Faces" is the title of a 13½-minute, color, Soil Conservation Service movie to be introduced soon through television stations. It traces changes in the pattern of U.S. land use since the day of Thomas Jefferson. Prints will be available later at State SCS motion picture libraries.

Soil and Water Research
SPANS A CENTURY

By Carl W. Carlson

Soil moisture is measured today by neutron moisture probe, using atomic radiation.

EARLY soil and water management practices in the United States were developed from research conducted in Europe.

But this arrangement did not work too well, because the climate and soils in this country were much different from those in western Europe. However, in those days no one was too concerned, because soil and water resources were abundant; and, because of these abundant resources, interest in soil and water research was slow to develop in this country.

Back in Civil War days a century ago, several outstanding scientists already were emphasizing that "wornout" soils were being abandoned at an alarming rate, and that the land slopes were eroding away. Only a few American farmers listened to their warnings, however, and even fewer understood. Most of them were not ready to apply science to their farming operations.

In the years that followed, some field experiments were begun; and, by 1890, many studies with lime, fertilizer, crop rotations, tillage, drainage, and irrigation were under way, based mainly on trial-and-error methods.

During the next two decades, American scientists working on the physics of water in the soil, became known internationally. The first scientific understanding of soil erosion processes was advanced. Soil texture—the relative amounts of sand, silt, and clay—was first recognized as important to plant growth.

Scientists during this period found that applying nutrients to the soil in the amount removed by a crop was not the answer to soil fertility problems. Chemistry of soils was advancing, and scientists were predicting that countries depending upon wheat bread for their diet could survive only if a source of nitrogen was found. These workers preferred that methods of nitrogen fixation of atmosphere nitrogen by chemical processes be developed as this source.

About this same time, the first attempts were made to develop coefficients for use in designing farmers' drains. Studies of methods for controlling excess rainfall and preventing gully formation were in progress. Level terraces were included, for the first time, in these experiments. Woods or pastures were used for terrace outlets, to avoid concentration of runoff.

A nationwide system of soil classification began to be developed, that would allow not only for the orderly planning of soil research, but also for the application of the research results to the farmers' fields.

Field and greenhouse experi-

Early runoff and erosion measuring plots in New Jersey no longer in existence.

Note:—The author is assistant director for soil management, Soil and Water Conservation Research Division, Agricultural Research Service, Beltsville, Md.

ments conducted during this time showed that some soils required nitrogen, phosphorus, and potassium. Other soils responded only to one or, in some cases, two of these three important elements. The phosphorus fertilizer used at that time was mined in the United States, but the nitrogen had to be shipped from South America and the potassium from Germany.

By 1912, homesteading in the United States was about ended, and agriculture was spread over a wide area. Many leaders in the field of soil and water felt that agriculture was spread over more land than was needed, and that many unsuitable soils had been developed in the movement. Soil problems such as wind and water erosion, declining soil fertility, loss of soil structure, and poor surface and subsurface drainage were developing rapidly. Many farming operations were exploitative; and plans appeared to be only on a short-run basis, despite scientists' warnings.

World War I brought great demands for food and fiber, and high prices. Under such conditions, even poor managers on unresponsive soils could stay in business. What should have been a gradual adjustment, starting about 1910, began precipitously when the war was over. Agriculture was depressed, but lowering production either on the acreage or yield basis was unpopular with the public. With lowered farm income came further depletion of the soil and water resources.

By this time, soil and water conservation research was becoming established in most of the country. The national soil survey was well under way. Potassium fertilizer, not available from Germany during the war, now was being obtained from deposits in the United States.

During the 1920's, soil erosion studies, started earlier in Missouri, were expanded, and the hydraulic characteristics of drainage channels were evaluated. Hydraulic

Rainfall simulator enables soil erosion researchers to collect several years' data in single year.

flow in drain and tile pipes was studied. Experiments to determine the value of various types of terraces were in progress.

Even with these activities, public interest in soil and water problems spread slowly. Agriculture was said to be overproducing already. About 1925, H. H. Bennett, who had been "preaching" against soil erosion for many years, began writing more dramatically about the damage resulting from poor management of our soil and water resources. His dogged campaign did much to awaken the country to the problem; and by the mid-1930's, a team approach had been developed on principles and techniques that could be used to help solve soil and water conservation problems. These "teams" studied such factors as the erosive power of rain, ground cover and mulch practices to control erosion, and the influence of degree and length of slope on the loss of soil and water.

At this time, watershed treatments were recognized to have a great deal to do with downstream flooding. Several watersheds were selected throughout the United States for study of the factors governing their hydrology. An evaluation of procedures for reliable flood prediction also was included.

During this period, American scientists showed that clay particles were crystalline and could be identified with X-ray, and the fixation of atmospheric nitrogen by catalytic combination of nitrogen and hydrogen to form ammonium was developed. The field of soil physics also came into its own during the 1930's, with methods developed for measuring soil moisture, and the hydraulic conductivity of the soil.

As a result of the Great Plains drought in the 1930's, an expanded basic research program was initiated in 1947 to study the principles involved in wind erosion. Principles determined in these studies have been widely used to develop conservation control measures on the land.

Radioactive materials were used in the 1950's to determine how much of the nutrient in the plant came from the applied fertilizer and how much from the soil. Incubation tests were developed to estimate the nitrogen requirements of various soils. These developments gave more meaning to fertilizer recommendations made to farmers.

Equipment and apparatus used in soil and water conservation research have undergone radical changes in the past 100, 50, and even 20 years. Soil-moisture measurements now can be made by the use of atomic radiation. Multiple-channeled recorders today make it possible to measure many factors on the same experiment. Interpretation of experimental results has been simplified by high speed computors and other data-analyzing techniques.

There also have been rapid advances in the equipment industry that have made possible once prohibitive earthmoving, water control, and other practices.

Although a considerable knowledge of our soil and water resources has been gained through research, there is still much that is not known or understood; and continuing research is essential.

GRASS ALONG THE BITTERROOT

By C. A. Rose

THE mainly grass-and-livestock farming in Montana's Bitterroot Valley is at last on a sound and conservation-guided basis after a century and a half of trial marked mostly by disappointment.

Local agricultural history had its buckskin beginning in the valley when Captain William Clark made note of the valley's "poor and stony soils" in his diary of the 1805-06 expedition with Meriwether Lewis.

The valley flanks the Bitterroot River for nearly 100 miles in the southwestern part of the State. The rugged Bitterroot Range on the west casts an effective rain shadow. Rainfall averages 12 to 13 inches a year in the lower valley, and 17 inches in the upper part.

Irrigation came to the valley in 1841, when the Jesuit missionary, Pierre Jean DeSmet, taught the Indians to grow potatoes and grain by applying water on their lands. Settlers moved in 10 years later and added to the development. Near the century's turn, there was a brief orchard boom, which made a drastic change in the ownership pattern. It was the idea then that 10 acres in orchard would yield a good living.

Livestock stayed in the valley, however; and, when the orchard boom had died, grazing pressure expanded. Farmers found that, by irrigating the old orchard tracts, they could grow better grasses. About 2 acres of bluegrass could sustain a cow and her calf from 4 to 5 months.

Developing irrigated pastures became a principal aim of the Bitterroot Soil Conservation District farmers and ranchers when they formed the district in 1941. The district's supervisors agreed the area's destiny lay in better pastures. Soil Conservation Service technicians working with the district agreed, and soil surveys showed their conclusion to be right. Rancher Fred Porch on Upper Three-mile Creek offered his land for trial seedings, in a checkerboard pattern of smooth bromegrass, tall fescue, meadow fescue, orchardgrass, Russian wildrye, tall oatgrass, timothy, Ladak alfalfa, and Alsike clover, under irrigation

Bailey's Herefords are grazing in rotation.

2-year-old irrigated pasture on land Rancher Homer Bailey said had not paid taxes for 25 years before.

at 10-day intervals.

When Porch turned a few of his cattle in on the plantings about May 1, 1944, they grazed the new grass plantings rather than adjoining alfalfa and bluegrass. Clippings and weighings showed that bromegrass gave the highest yield —more than 3 tons an acre, with the tall fescue, meadow fescue, tall oatgrass, and orchardgrass close behind. Timothy yielded 2 tons an acre. Farmers also began using fertilizer on their pasture plantings, finding production increased up to twice as much as that without fertilizer.

The Homer Bailey ranch provides a good example of improved conservation pasture management. In 1950, Bailey packed a good seedbed and seeded smooth brome, Alta fescue, orchardgrass, and Ladino clover on 28 acres that "had never paid its taxes." He fenced off four 7-acre pastures, irrigated as needed, and mowed weeds once.

"When the production went to 600 pounds an acre, I was satisfied," Bailey said of the gains he is realizing today, after stepping up the number of grazing animals on his pastures and still cutting much of the grass for hay.

Not all of the irrigated land in the Bitterroot Valley is tillable.

Note:—The author is work unit conservationist, Soil Conservation Service, Hamilton, Mont.

Thousands of acres are too stony. Kentucky bluegrass and white clover are at home in these areas.

Significant of a century or more in the grassland cycle in this area is the fact that the agricultural census in 1949 showed only 10,745 acres of improved pasture in the valley; whereas the 1959 census showed 30,000 acres—or treble the acreage of a decade before—and the potential in pasture development and management in Bitterroot Valley is still far from being realized.

Conservation Helps Lick Century-Old Sedimentation Bugaboo

By John N. Holeman

WE can protect our reservoirs and harbors from the more than century-old problem of their being clogged with sediment fed into them by soil erosion on their watersheds. At least that is the plain conclusion to be drawn from up-to-date resurveys of selected sedimentation trouble spots in Maryland and elsewhere in the country.

Each year, more sediment is removed from our rivers and harbors than the entire volume of material removed during excavation at the Panama Canal—566 million cubic yards as against 328½ cubic yards. Such dredging operations have been carried on in some Maryland and other waters since the early 1800's.

The Soil Conservation Service long has recognized that the most economical way of reducing such sedimentation damages is to hold the soil at its source. It has been shown many times over that, by applying conservation land-treatment measures and using the land within its capabilities, the sediment yield from a watershed can be reduced to tolerable limits. Such measures include contouring, strip-cropping, terracing, grassed waterways, gully control, crop rotations, and crop residue management, along with grass and tree plantings, and farm ponds, in combinations which may be needed to fit particular situations.

The SCS has resurveyed several reservoirs below watersheds which have had these conservation measures applied on them, and has found the yield of sediment has been reduced substantially. Examples of this reduction include the Gunpowder Falls watershed in Maryland, Lake Newman in Georgia, Highpoint Reservoir in North Carolina, and Lake Waco in Texas.

Sediment yield to Loch Raven on the Gunpowder Falls, for example, dropped from 185 acre-feet annually from 1914 to 1943 to only 41 acre-feet a year from 1944 to 1961, or less than one-fourth of the former amount. The sediment yield at Prettyboy Reservoir, also on Gunpowder Falls, meanwhile, dropped from 54.2 to 30.3 acre-feet.

The 1961 survey of these reservoirs substantiated the effectiveness of the watershed-protection method of sediment reduction. In 1943, it was recognized that the greatest amount of sediment in

Loch Raven Reservoir with sediment deposits (top) encroaching upon its open water—1938.

Note:—The author is geologist, Soil Conservation Service, Beltsville, Md.

Only 5 years later.—Note how sediment had formed a large bar (upper left) and almost choked outlet in foreground.

these two reservoirs came from sheet erosion on cultivated summit uplands. (See "Sedimentation in a Great Harbor," SOIL CONSERVATION, July 1944.) Since then, there has been a big change in land use, with many conservation measures put into practice on the watershed and a substantial acreage going out of cultivation.

The SCS estimates that of the land currently in cultivation, 22 percent has the benefit of conservation crop rotations, 17 percent of stripcropping, 22 percent of contouring, and 2 percent of cover cropping—in addition to other conservation practices. It was the sediment from this watershed which, in the early 18th century, choked the harbor of the most properous seaport of Maryland—Joppa Town—resulting in its decline and final abandonment.

Elk Ridge Landing was established near the head of navigation on the Maryland Patapsco estuary and was a shipping center before the first house was built in Baltimore. Today, the head of navigation has moved about 7 miles downstream to the Hanover Street Bridge at Baltimore. The Coast and Geodetic Survey Chart of 1845 showed the Patapsco to be 17 feet deep along the left bank under the bridge. By 1898, it was only 3½ feet deep, and by 1924 only 6 inches deep!

The Federal Government began dredging the Patapsco estuary in 1836, and has continued to do so ever since. By 1960, almost $26 million of Federal money had been spent in keeping the port open; and about 141 million cubic yards of material had been removed from Baltimore Harbor. In the 20 years from 1940 to 1960, dredging from Baltimore Harbor totaled more than 30 million cubic yards, costing almost $10 million. Twenty-one percent of the yardage removed during 124 years has been in the last 20 years, representing about 38 percent of the total cost.

Fortunately, indications are that sedimentation from the Patapsco has decreased in the past 5 years. The quantity of sediment dredged from Baltimore Harbor from 1955 to 1960 was 3.8 million cubic yards, with no new protective work. In the preceding 5 years, 5.2 million cubic yards of sediment was removed in maintenance, and 3.7 million cubic yards in new work.

Sediment accumulation in Baltimore's water-supply reservoirs also has been a continuing expense. In 1862—just a century ago—the city's first water-supply reservoir, Lake Roland, was built on Jones Falls, with a storage capacity of 400 million gallons. It became

1957 view shows reservoir water further displaced (center) by accumulated sediment, with brush now growing on higher fill.

necessary to begin sediment removal within only 10 years, and, in spite of the dredging of 434,000 cubic yards of sediment from the lake by 1900, the sediment-choked reservoir finally was abandoned in 1915.

A similar sequence beset Old Loch Raven Reservoir, completed on Gunpowder Falls in 1881, replaced by a new dam upstream in 1914, and supplemented in 1933 with Prettyboy Reservoir.

Keeping the ports of the United States navigable and its multitude of municipal, irrigation, industrial, and other reservoirs productive of their essential water supplies is a continuing operation. In 1960, dredging activities were in progress along the Atlantic and Gulf coasts from Maine to Texas, and in Pacific ports from Puget Sound to San Diego. For example, in the fiscal year ended June 30, 1960, a total of 74,160 cubic yards of silt was removed from the Penobscot River for maintenance of the harbor at Bangor, Maine; and sediment removal was carried on all along the Atlantic Ocean and Gulf of Mexico to Brownsville, Tex.

The same situation exists along the Pacific coast. During the last 5 years, the average annual maintenance cost for Puget Sound has been $125,000. During fiscal year 1960 in San Francisco Harbor, 763,000 cubic yards of sediment was removed from the main ship channel, at a cost of $177,660. To the same date, $2¾ million had been spent in maintenance of the Los Angeles and Long Beach harbors.

Almost any United States port could be added to the examples of the costly effects of sedimentation resulting from watershed erosion. The continuing century-and-more-old challenge of reducing the amount of sediment reaching our streams, reservoirs, lakes, harbors, and estuaries thus clearly is demonstrated to be intimately interrelated with soil erosion control and agricultural water management.

Old Farm Stays Proudly On

In Megalopolis' Path

By David A. Bennett

IN 1696 one Samuel Emerson bought 15 acres of land north of Frenchmen's Creek on the Bellamy River at Dover in New Hampshire for 30 pounds and 5 shillings. In the more than 250 years since then, use of this and surrounding land has undergone many changes. The farm, enlarged since Samuel Emerson bought it, now is struggling to stay out of the megalopolis that's engulfing the area, in which the U.S. Department of Agriculture has helped landowners in their farming operations for the past 30 years.

From records of the old place at Dover, the G. Allen Huggins, present owners, tell an interesting story of the various uses that have been made of the land down the years. Early-day crop production "records" can still be seen where they were jotted down on the exposed, hand-hewn rafters in the attic of the homestead, built between 1690 and 1700. They include notations such as "29 bu. barley 1820," "100 lbs. flax 1818," "25 bu. barley and 6½ bu. flaxseed 1821," and "13 sheep 1808."

A hogshead used for measuring barley still is in the attic. Flax wheels, spinning wheels, a loom, and other early weaving tools make the attic a paradise of antiques.

The farm was enlarged in 1700. Flax and barley were the main crops until about 1880, about the time one Mark Chase bought the farm, for $10,000. Dairy farming was the main source of income from then until 1918, when Ralph Towle took over ownership and promptly made a $12,000 harvest cut of standing timber.

The Huggins bought the property in 1929. Mrs. Huggins, an outdoors woman with a green thumb, operated the farm herself through World War II, as her husband, a banking consultant in

Note:—The author is soil conservation aid, Soil Conservation Service, Rochester, N. H.

Wildlife finds a haven on Huggins farm around this 260-year-old wood shingled house.

The fireplace still is used for cooking.

a 3-State area, was away much of the time.

In 1948 she became a cooperator with the Strafford County Soil Conservation District, and received help from the Soil Conservation Service in preparing a coordinated soil and water conservation plan for the entire farm, now increased to 141 acres.

Wildlife and woodland conservation are the central part of the plan. As Mrs. Huggins had to cut down on her farming operations, part of the land now is leased to a neighboring dairy farmer. Wildlife is benefited by a farm pond and 1,400 feet of multiflora rose hedge. Meantime, the land is going back into forest, its original condition, for use of wildlife.

Besides taking care of the existing woodland, Mrs. Huggins plans to plant trees on a 30-acre field that is too wet for other crops. The trees, she points out, will provide additional cover for more wildlife. Another pond also is planned for the benefit of wildlife, and for its recreational value. Geese fly in from the nearby saltwater bays to rest and feed. In one field is a knoll that usually is clear of snow. Once, as ice covered the bays, 30 hungry and weak geese took refuge on the knoll Seeing their condition, Mrs. Huggins notified the local game conservation officer, who fed them corn until they could take care of themselves again.

The Richmond-to-Boston megalopolis is closing in on this farming area; but the Huggins find a rewarding life in their colonial home, which remains much the same as it was a century and a half ago, with its open fireplaces in each room, dutch oven for baking, and original furnishings.

LAND OF PLENTY THE AMERICAN FARM STORY. By Wheeler McMiller. 138 pp. 1961. Holt, Rinehart and Winston. New York. $3.95.

Wheeler McMillen has drawn upon a lifetime background as a reporter of agricultural progress in telling the success story of American farmers' efficient production. It is a story of how they, 9 percent of our population, now produce more than enough for present needs.

Land of Plenty is an interesting and informative account of technical and scientific changes in farm machinery, crops, control of insects and diseases, agricultural education and research, and farm cooperatives.

The author interprets the Nation's agricultural productivity, not just in terms of the country's fertile soil and favorable climate, but as a product of the American freedoms and institutions that started with the pioneer one-room schools and include the 100-year-old Department of Agriculture and Land-Grant Colleges that have developed agricultural science and technology into conventional working tools for farm families.

The book is written from the agrarian viewpoint that dominated America through Mr. McMillen's generation. He manages well to convey to the reader the "feel" of our national heritage—a respect for hard work that has given dignity to American farmers. Making the point that, to the present, it has been as much of a challenge to capable young men to become agricultural scientists as to be rocket scientists, he makes it clear that we do not dare to lose that emphasis.

The book also draws the clear conclusion—one that is easily overlooked by today's urban-oriented society—that our great industrial economy would not have been possible without benefit of our agricultural productivity.

The author pays special tribute to the late H. H. Bennett for his outstanding contributions in awakening the Nation to a realization of how truly precious topsoil is, how fast it was being lost, and how all mankind must forever be dependent for food on a few inches of topsoil. He describes how Dr. Bennett's efforts resulted in the nationwide soil and water conservation program now carried on by farmers in local soil conservation districts.

—GLADWIN YOUNG

Have You Seen? ····

● The new *Great Plains Journal,* published semiannually in Lawton, Okla., by the Great Plains Historical Association. It is devoted to that region's history, environment, agriculture, conservation, and other subjects, and includes in the first issue an article on "Conservation in the Future of the Great Plains," by SCS Administrator Donald A. Williams.

● "Waterweed Control on Farms and Ranches," by Verne E. Davison, John M. Lawrence, and Lawrence V. Compton, published as USDA Farmers' Bulletin 2181. It describes in detail the types of

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waterweeds; the problems they present in fishponds, irrigation reservoirs, and ditches; their prevention; and their control by fertilization or use of chemicals.

THE NEXT 25 YEARS

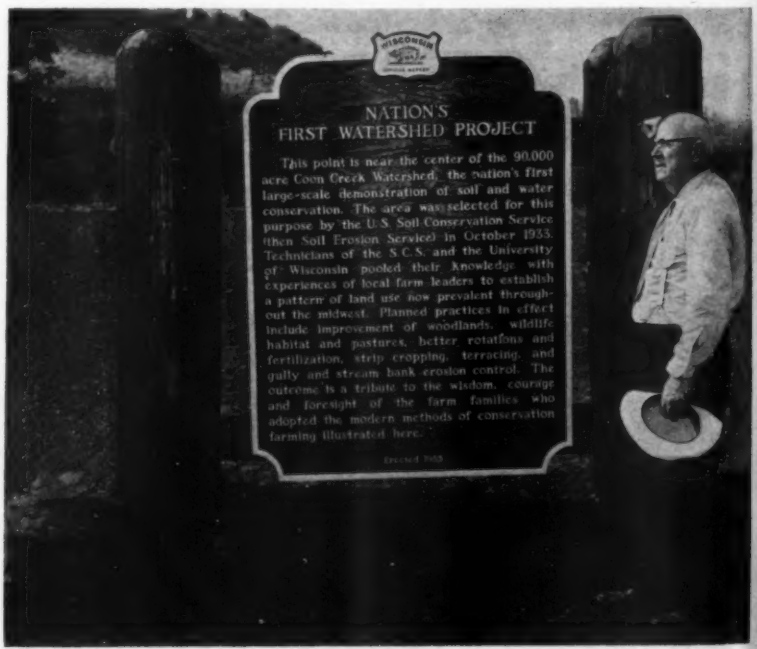
"As people look more carefully at their land and water, parks and timber, wildlife and shorelines, there will be a better, broader understanding of how all these resources are related, and fit together. More people will learn, for example, that what happens to the land and timber upstream, affects the water supply downstream. More people will learn, too, that all sections do not have enough resources of all kinds for all purposes. The need for planning will become more evident; the chance of controversy over priorities of use will increase.

"With 25 years of increasingly broad experience in resource planning and programs—and with a direct assignment by the States to act constructively in their field—districts can anticipate a period of added responsibilities and greater pressure. No other existing instrument of government has a greater potential for representing effectively the resource needs and desires of entire communities.

"Districts developed primarily for the conservation of soil and water—and for the benefit of agriculture. Now many districts are being called on to help with other resources, and give increased attention to the needs of their urban and suburban residents. Districts can serve more people; more resources. The clear challenge of the next 25 years, then, is the challenge of wider, greater service."

—From program of twenty-fifth anniversary dinner for soil conservation districts, sponsored by the Natural Resources Council of America, Washington, D. C., March 19, 1962.

Conservation History Marches On


NATION'S
FIRST WATERSHED PROJECT
This point is near the center of the 90,000 acre Coon Creek Watershed, the nation's first large-scale demonstration of soil and water conservation. The area was selected for this purpose by the U.S. Soil Conservation Service (then Soil Erosion Service) in October 1933. Technicians of the S.C.S. and the University of Wisconsin pooled their knowledge with experiences of local farm leaders to establish a pattern of land use now prevalent throughout the midwest. Planned practices in effect include improvement of woodlands, wildlife habitat and pastures, better rotations and fertilization, strip cropping, terracing, and gully and stream bank erosion control. The outcome is a tribute to the wisdom, courage and foresight of the farm families who adopted the modern methods of conservation farming illustrated here.

It was a proud day for the late Dr. Hugh Hammond Bennett when he posed in 1955 beside this marker proclaiming the site of the first watershed project in the United States, established in 1933—nearly a quarter of a century before.